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March 8, 2004

The United States of America

The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

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Commissioner of Patents and Trademarks

Attest

[54] METHOD AND APPARATUS FOR INTERACTIVELY MANIPULATING AND DISPLAYING PRESUMPTIVE RELATIONSHIPS BETWEEN GRAPHIC OBJECTS

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[22] Filed: **May 8, 1995**

[51] Int. Cl.^{6} G06T 3/00

[52] U.S. Cl. 395/133; 395/137; 395/138; 395/326

[58] Field of Search ....:................. 395/133, 135, 395/137–139, 141, 155, 159, 160, 161, 919; 364/474.24

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[57] ABSTRACT

A presumptive mode computer aided design and drafting system for interactively manipulating and displaying graphic objects that employ predefined rules to govern the geometric layout and logical relationships representing a physical design, schematic or process flow diagram. The system is configured to comply with the rules employed by various design disciplines. Specific interactive computer graphics behavior is dynamically accessed to interactively update graphic object relationships according to rules of geometric conduct. The rules of geometric conduct may be stored in external databases along with parameters to verify the logical relationships of the graphic objects used in the drawing. Object orientation is employed in the software design of the system to allow new devices or procedures to adopt the behavior of existing definitions. In the preferred embodiment, a selected object floats with a cursor in a graphic environment until located in proximity with underlying graphic objects. The selected object then aligns, jumps and clings to the underlying graphic object or objects according to predetermined rules. For example, the object is automatically rotated, orientated and positioned relative to a cling point into a correct relationship with the underlying object without further input by the operator. Further, the selected object slides along the underlying graphic object maintaining the correct geometric relationship while the operator moves the cursor in proximity with the underlying graphic. The operator either accepts the presumed relationship or moves the cursor away to uncling the selected object.

24 Claims, 13 Drawing Sheets